

WHAT IS CLAIMED IS

1           1. A data stream compression apparatus comprising  
2  
3   a data stream processing element for receiving a first stream of data entities at a  
4   first line rate, each data entity including a data packet and a gap, and responsive to  
5   a control signal for generating a second stream of data entities at a second line  
6   rate which is less than the first line rate,  
7  
8   a control unit for providing said control signal identifying a predetermined portion  
9   of non-unique, invariant content of said first stream of data entities, and  
10  
11   wherein said data stream processing element in response to said control signal  
12   removes said predetermined portion of non-unique, invariant content of said first  
13   stream of data entities thereby generating said second data stream of data entities  
14   at the second line rate.

1           2. The data stream compression apparatus of claim 1 wherein the non-  
2   unique, invariant content of said first data stream is determined in real-time.

1           3. The data stream compression apparatus of claim 1 wherein the non-  
2 unique, invariant content includes one or more interpacket characters.

1           4. The data stream compression apparatus of claim 1 wherein said first  
2 data stream is gigabit Ethernet data stream and the non-unique, invariant content  
3 includes one or more PREAMBLE characters.

1           5. The data stream compression apparatus of claim 1 wherein said first  
2 data stream is gigabit Ethernet data stream and the non-unique, invariant content  
3 includes one or more IDLE2 characters.

1           6. The data stream compression apparatus of claim 1 wherein said non-  
2 unique, invariant content of said first stream of data entities has been  
3 predetermined.

1           7. The data stream compression apparatus of claim 1 being part of a data  
2 communication system including said data stream compression apparatus  
3 connected to transmit said second data stream over a communication link to a data  
4 stream expansion apparatus, said data stream expansion apparatus comprising  
5  
6 a data stream processing element for receiving said second data stream of data  
7 entities from the communication link at a second line rate and responsive to a

8 control signal for generating a first stream of data entities at a first line rate which  
9 is greater than the second line rate,  
10  
11 a control unit for providing said control signal identifying a predetermined portion  
12 of non-unique, invariant content which is to be added to said second data stream  
13 of data entities, and  
14  
15 wherein said data stream processing element in response to said control signal  
16 adds said predetermined portion of non-unique, invariant content to said second  
17 data stream of data entities thereby generating said first data stream of data  
18 entities at the first line rate.

1 8. A data stream expansion apparatus comprising

2  
3 a data stream processing element for receiving a second data stream of data  
4 entities at a second line rate and responsive to a control signal for generating a  
5 first stream of data entities at a first line rate which is greater than the second line  
6 rate,  
7  
8 a control unit for providing said control signal identifying a predetermined portion  
9 of non-unique, invariant content which is to be added to said second data stream  
10 of data entities, and

11

12 wherein said data stream processing element in response to said control signal  
13 adds said predetermined portion of non-unique, invariant content to said second  
14 data stream of data entities thereby generating said first data stream of data  
15 entities at the first line rate.

1 9. The data stream compression apparatus of claim 8 wherein the non-  
2 unique, invariant content of said first data stream is determined in real-time.

1 10. The data stream compression apparatus of claim 8 wherein the non-  
2 unique, invariant content includes one or more interpacket characters.

1 11. The data stream compression apparatus of claim 8 wherein said first  
2 data stream is gigabit Ethernet data stream and the non-unique, invariant content  
3 includes one or more PREAMBLE characters.

1 12. The data stream compression apparatus of claim 8 wherein said first  
2 data stream is gigabit Ethernet data stream and the non-unique, invariant content  
3 includes one or more IDLE2 characters.

1           13. The data stream compression apparatus of claim 8 wherein said non-  
2           unique, invariant content of said first stream of data entities has been  
3           predetermined.

1           14. A data compression multiplexer apparatus comprising  
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3           (1) a plurality of data stream compression apparatuses, each comprising  
4  
5           a data stream processing element for receiving a first data stream of data  
6           entities at a first line rate, each data entity including a data packet and a gap, and  
7           responsive to a control signal for generating a second stream of data entities at a  
8           second line rate which is less than the first line rate,  
9  
10          a control unit for providing said control signal identifying a predetermined  
11          portion of non-unique, invariant content of said first stream of data entities, and  
12  
13          wherein said data stream processing element in response to said control  
14          signal removes said predetermined portion of non-unique, invariant content of  
15          said first stream of data entities thereby generating said second data stream of data  
16          entities at the second line rate, and  
17

18           (2) a data stream multiplexer for multiplexing said plurality of second data  
19 streams to generate a multiplexed data stream.

1           15. The data compression multiplexer apparatus of claim 14 including  
2           eight data stream compression apparatuses,  
3           wherein each said first data stream is a gigabit Ethernet data stream at 1.25  
4 Gb/s, and  
5           wherein said multiplexed data stream generated by said data stream  
6 multiplexer is less than or equal to the SONET OC-192 line rate.

1           16. The data compression multiplexer apparatus of claim 14 being part of  
2 a data communication system including said data compression multiplexer  
3 apparatus connected to transmit said multiplexed data stream over a  
4 communication link to a data expansion demultiplexer apparatus, the data  
5 expansion demultiplexer apparatus comprising  
6  
7 (1) a data stream demultiplexer for demultiplexing a received multiplexed data  
8 stream from the communication link into a plurality of second data streams and  
9  
10 (2) a plurality of data stream expander apparatuses, each for processing one of the  
11 plurality of second data streams, each data stream expander apparatus including  
12

13           a data stream processing element for receiving a second data stream of  
14   data entities at a second line rate and responsive to a control signal for generating  
15   a first stream of data entities at a first line rate which is greater than the second  
16   line rate,

17

18           a control unit for providing said control signal identifying a predetermined  
19   portion of non-unique, invariant content which is to be added to said second data  
20   stream of data entities, and

21

22           wherein said data stream processing element in response to said control  
23   signal adds said predetermined portion of non-unique, invariant content to said  
24   second data stream of data entities thereby generating said first data stream of  
25   data entities at the first line rate.

1           17. A data expansion demultiplexer apparatus comprising

2

3   (1) a data stream demultiplexer for demultiplexing a received multiplexed data  
4   stream into a plurality of second data streams and

5

6   (2) a plurality of data stream expander apparatuses, each for processing one of the  
7   plurality of second data streams, each data stream expander apparatus including

8

9 a data stream processing element for receiving a second data stream of  
10 data entities at a second line rate and responsive to a control signal for generating  
11 a first stream of data entities at a first line rate which is greater than the second  
12 line rate,

13

14 a control unit for providing said control signal identifying a predetermined  
15 portion of non-unique, invariant content which is to be added to said second data  
16 stream of data entities, and

17

18 wherein said data stream processing element in response to said control  
19 signal adds said predetermined portion of non-unique, invariant content to said  
20 second data stream of data entities thereby generating said first data stream of  
21 data entities at the first line rate.

1 18. The data expansion demultiplexer apparatus of claim 17 including  
2 eight data stream expansion apparatuses,

3 wherein the data rate of the received multiplexed data stream is less than  
4 or equal to the SONET OC-192 line rate, and

5 wherein at least one of the data stream expansion apparatuses receives a  
6 second data stream from the data stream demultiplexer and generates therefrom a  
7 gigabit Ethernet data stream at 1.25 Gb/s.



1           19. A method of operating a data stream compression apparatus  
2   comprising the steps of:  
3  
4   receiving a first stream of data entities at a first line rate, each data entity  
5   including a data packet and a gap,  
6  
7   identifying a predetermined portion of non-unique, invariant content of said first  
8   stream of data entities, and  
9  
10   removing said predetermined portion of non-unique, invariant content of said first  
11   stream of data entities thereby generating said second data stream of data entities  
12   at the second line rate.

1           20. A method of operating a data stream expansion apparatus comprising  
2   the steps of:  
3  
4   receiving a second data stream of data entities at a second line rate,  
5  
6   identifying a predetermined portion of non-unique, invariant content which is to  
7   be added to said second data stream of data entities, and  
8

- 9 adding said predetermined portion of non-unique, invariant content to said second
- 10 data stream of data entities thereby generating said first data stream of data
- 11 entities at the first line rate.